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Claims

1. A metal sheet or metal sheet section comprising a lubricant coating, wherein said lubricant is in particular a corrosion protection oil, pre-lube, and/or dry-lube, characterised in that the metal sheet or the metal sheet section comprises a layer which is formed by the application onto the metallic surface of a solution containing an organic phosphoric acid ester.

2. The metal sheet or metal sheet section according to Claim 1, characterised in that the organic phosphoric acid ester is a compound of the general formula

$$X_{3-n}PO_4R_n$$

where X stands for hydrogen, Na, K, $-NH_2$, -NHR, $-NR_2$, $-NH(R'-OH)$, $-N(R'-OH)_2$, or $-NR(R'-OH)$, R stands for a straight-chain or branched alkyl group with 1 to 14 carbon atoms, in particular 1 to 8, R' stands for a straight-chain or branched alkyl group with 1 to 14 carbon atoms, in particular 1 to 8, whereby one or more hydrogen atoms in R and R' can be substituted by a polymer or oligomer group -Y-R, wherein Y stands for $(CH_2-CH_2-O-)_m$ or $(CH_2-CH(CH_3-O-)_m$, with m = 1 to infinity, and, in particular, m = 1 to 10, R and R' can in each case be equal or different, and n is a number from 0 to 3, with the proviso that n is not 0 if X stands exclusively for hydrogen.

3. The metal sheet or metal sheet section according to any one of the foregoing claims, characterised in that the organic phosphoric acid ester is a mixture of $(C_4H_9\text{-}O)OP(OH)_2$ and $(OH)P(O\text{-}C_4H_9)_2$.

4. The metal sheet or metal sheet section according to any one of the foregoing claims, characterised in that the solution containing the organic phosphoric acid ester contains, as further components, a water-soluble organic sulphur compound and/or an organic molybdenum compound.

5. The metal sheet or metal sheet section according to Claim 4, characterised in that the organic sulphur compound is selected from the group consisting of thiadiazolene, dithiocarbamates, and dithiopropionates, as well as salts and derivatives thereof.

6. The metal sheet or metal sheet section according to Claim 4 or 5, characterised in that the organic sulphur compound is selected from the group consisting of sodium-2-mercaptobenzothiazole, 2,5-dimercapto-1,3,4-thiadiazole, as well as salts and derivatives thereof, sodium dimethyl dithiocarbamate, potassium dimethyl dithiocarbamate, and monoethanol amine dithiopropionate.

7. The metal sheet or metal sheet section according to Claim 6, characterised in that the organic sulphur compound can be obtained by the conversion of molybdenum trioxide and/or molybdeneic acid with an amine and/or alkanolamine.

8. The metal sheet or metal sheet section according to any one of the foregoing claims, characterised in that the solution containing the phosphoric acid ester contains, as further components, at least one inorganic compound from the group consisting of polyphosphates, borates, molybdates, and wolframates.

9. The metal sheet or metal sheet section according to Claim 8, characterised in that the inorganic compound is selected from the group consisting of ammonium tripolyphosphate, sodium tetraborate, ammonium molybdate, sodium wolframate, potassium wolframate, and sodium wolframate.

10. The metal sheet or metal sheet section according to Claim 1, characterised in that the layer formed by the solution containing the phosphoric acid ester is formed as a thin layer in the nano range.

11. The metal sheet or metal sheet section according to any one of the foregoing claims, characterised in that a layer containing lubricant, in particular a corrosion protection oil, pre-lube, and/or dry-lube, is formed on the layer formed by the phosphoric acid ester.

12. The metal sheet or metal sheet section according to Claim 11, characterised in that the layer containing lubricant is formed in a thickness from 0.3 to 3.0 g/m^2, in particular 1 to 2 g/m^2.

13. The metal sheet or metal sheet section according to any one of the foregoing claims, characterised in that the lubricant contains an organic phosphoric

acid ester such as defined heretofore in a quantity from 0.01 to 50 % by weight, in particular from 0.05 to 10 % by weight.

14. The metal sheet or metal sheet section according to any one of the foregoing claims, characterised in that the lubricant contains a water-soluble organic sulphur compound as defined heretofore in a quantity from 0.005 to 30 % by weight, in particular from 0.01 to 5 % by weight.

15. The metal sheet or metal sheet section according to any one of the foregoing claims, characterised in that the lubricant contains an organic molybdenum compound as defined heretofore in a quantity from 0.005 to 30 % by weight, in particular from 0.01 to 5 % by weight.

16. The metal sheet or metal sheet section according to any one of the foregoing claims, characterised in that the lubricant contains an organic compound as defined heretofore in a quantity from 0.005 to 30 % by weight, in particular from 0.01 to 5 % by weight.

17. The metal sheet or metal sheet section according to any one of the foregoing claims, characterised in that the sheet is a coated or uncoated steel sheet.

18. The method for the manufacture of a metal sheet section according to any one of Claims 1 to 17, characterised by the following steps:

- Application of a solution containing an organic phosphoric acid ester on the upper and/or lower side of the sheet, and

- Application of a lubricant onto the sheet coated in this way.

19. The method according to Claim 18, characterised in that the application of the solution containing the organic phosphoric acid ester is effected by immersion, spraying, brushing, or roll coating.

20. The method according to Claim 18 or 19, characterised in that the application of the solution containing the organic phosphoric acid ester is effected during the coating of the sheet in the flushing bath of a coating system or during the cooling of the sheet in the bath of a water cooling system.

21. The method according to any one of Claims 18 to 20, characterised in that an aqueous solution of the organic phosphoric acid ester is applied.

22. The method according to any one of Claims 18 to 21, characterised in that a solution is applied which contains the organic phosphoric acid ester in a concentration from 0.1 to 15 % by weight, and in particular 3 to 8 % by weight.

23. The method according to any one of Claims 18 to 22, characterised in that the pH of the solution is adjusted to a value of 6.5 to 11, in particular 7.5 to 9.5.

24. The method according to any one of Claims 18 to 23, characterised in that a solution is applied which contains as further components a water-soluble organic sulphur compound, in particular one of the

compounds described in Claim 5 or 6, and/or an organic molybdenum compound, in particular one of the compounds described in Claim 7.

25. The method according to Claim 24, characterised in that a solution is applied which contains the water-soluble organic sulphur compound(s) and/or organic molybdenum compound(s) in a quantity from 1 to 50 % by weight, in particular from 5 to 25 % by weight, related to the quantity of phosphoric acid ester.

26. The method according to any one of Claims 18 to 25, characterised in that a solution is applied which contains as further components at least one of the inorganic compounds described in Claims 8 and 9.

27. The method according to Claim 26, characterised in that a solution is applied which contains the inorganic compounds in a quantity from 1 to 50 % by weight, in particular from 5 to 10 % by weight, related to the quantity of phosphoric acid ester.

28. The method according to any one of Claims 18 to 27, characterised in that the sheet is dried before the lubricant is applied.

29. The method according to any one of Claims 18 to 28, characterised in that use is made as the lubricant of corrosion protection oil, pre-lube, and/or dry-lube.

30. The method according to any one of Claims 18 to 29, characterised in that the lubricant is applied in a quantity from 0.3 to 3.0 g/m^2, in particular 1 to 2 g/m^2.

31. The use of a solution containing an organic phosphoric acid ester, in particular an organic phosphoric acid ester described in Claim 2 or 3, for the treatment of metal surfaces.

32. The aqueous solution for the treatment of metal surfaces containing an organic phosphoric acid ester, in particular one of the compounds described in Claim 2 or 3, and a water-soluble organic sulphur compound, in particular one of the compounds described in Claim 5 or 6, and/or an organic molybdenum compound, in particular one of the compounds described in Claim 7.

33. The aqueous solution according to Claim 32, characterised in that this contains as further components one of the organic compounds described in Claim 8 or 9.

34. The concentrate for the manufacture of a solution for the treatment of metal surfaces according to Claim 32 or 33.

35. The use of a metal sheet or metal sheet section according to any one of Claims 1 to 17, for the manufacture of metal bodies by forming, in particular by deep-drawing.